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A Survey of Sport Fishing in the Illinois Portion of Lake Michigan

March through September 2013

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University of Illinois
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Illinois Natural History Survey

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Division of Fisheries, Illinois Department of Natural Resources
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Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*
Bluegill sunfish	*Lepomis macrochirus*
Brown trout	*Salmo trutta*
Channel catfish	*Ictalurus punctatus*
Chinook salmon	*Oncorhynchus tshawytscha*
Coho salmon	*Oncorhynchus kisutch*
Common carp	*Cyprinus carpio*
Freshwater drum	*Aplodinotus grunniens*
Lake trout	*Salvelinus namaycush*
Largemouth bass	*Micropterus salmoides*
Northern pike	*Esox lucius*
Rainbow smelt	*Osmerus mordax*
Rainbow trout	*Oncorhynchus mykiss*
Rock bass	*Ambloplites rupestris*
Round goby	*Neogobius melanostomus*
Sea lamprey	*Petromyzon marinus*
Smallmouth bass	*Micropterus dolomieui*
White perch	*Morone americana*
Yellow perch	*Perca flavescens*

EXECUTIVE SUMMARY

The purpose of this study was to estimate sport fishing effort, harvest, and expenditures by anglers fishing the Illinois portion of Lake Michigan (excluding charter fishing). Information provided by this study is important for management of sport fisheries in the Illinois waters of Lake Michigan. Data were collected via a contact creel survey on randomly-selected days over a six month period (4/1 - 9/30), and were summarized and extrapolated over the six month period to obtain estimates for specific locations as well as for the entire Illinois portion of Lake Michigan. Sampling dates were randomly chosen for access sites within two strata: time period (segment = three week blocks) and type of day (weekday vs. weekend/holiday). An additional March survey was conducted at selected sites along the Lake Michigan shoreline. The March survey was stratified by weekend/ weekday, but the entire month of March was treated as one segment. All data have been summarized by month for this report.

Conclusions:

1. Total angler effort in 2013 declined 17.8% from the 2012 survey period. Effort decreased 16.6% for pedestrian anglers and decreased 18.7% for boat anglers.

2. The yellow perch harvest decreased 43.4% from 2012 estimates to 53,107 fish. Mean length increased 0.5% to 25.3 cm (10.0 in), while mean weight decreased 12.9% to 206 g (0.45 lb.).

3. Coho salmon comprised most of the salmonid harvest (67.4%) despite a 25.8% decrease in harvest compared to 2012. The estimated 2013 coho salmon harvest was 36,239 fish. The mean size of coho salmon measured by creel clerks in 2013 was 1,680 g (3.70 lb.), and 55.0 cm (21.7 in) long, representing increases of 17.8% in weight and 3.4% in length from 2012.

4. Chinook salmon harvest was estimated at 6,423 fish, a 53.0% drop from 2012. The mean size of Chinook in 2013 was 4,536 g (10.00 lb., an increase of 7.5%) and 70.6 cm (27.8 in) long (a decrease of 4.0% from 2012).

5. Compared to 2012, rainbow trout harvest decreased 32.6% to 3,154 fish. Mean rainbow trout weight increased 4.7% to 2979 g (6.56 lb.), while length decreased 0.8% to 65.0 cm (25.6 in).

6. The lake trout harvest decreased to an estimated 2,962 fish, an 18.5% decline from 2012. The mean length of lake trout harvested increased compared to 2012 by 0.9% to 65.8 cm (25.9 in), and mean weight decreased 2.1% to 3,026 g (6.67 lb.).

7. The estimated brown trout harvest increased 319.7% from 2012 to 5,015 fish. Mean length of harvested brown trout increased by 3.2% to 53.4 cm (21.0 in), and mean weight increased by 32.4% to 2,092 g (4. 618 lb.).

8. Estimates of total expenditures for boats, motors, trailers and fishing gear in 2013 were $1.48 million, 48.2% lower than in 2012.

9. In March, 2013 angler effort and harvest of yellow perch, brown trout, lake trout, rainbow trout, and coho salmon all decreased compared to 2012. Total effort was 3,849 angler hours, dropping 85.2% from 2012. March harvest in 2013 decreased 85.2% for yellow perch (1,135 fish), 96.3% for brown trout (67 fish) and 98.5% for coho salmon (47fish). No rainbow trout or lake trout harvest was documented in March of 2013, compared to an estimated 41 rainbow trout and 21 lake trout harvested in March, 2012.

ABSTRACT

A contact creel survey was conducted from April 1 to September 30, 2013, covering all legal sport fishing during that period (both by pedestrians and anglers fishing from boats) excluding fishing from chartered boats and smelt fishing. The intent of the survey was to provide reliable estimates of sport fishing activity, sport fish harvest, expenditures for sport fishing, and the quality and distribution of sport fishing for the Illinois portion of Lake Michigan. Total fishing effort for pedestrians and boaters for the survey period was estimated at 382,395 angler-hours. Total harvest estimates for major species during the survey period include 53,107 yellow perch, 5,015 brown trout, 3,154 rainbow trout, 2,962 lake trout, 36,239 coho salmon, and 6,423 Chinook salmon. Angler expenditures for boats, motors, trailers and fishing gear were estimated at $1.48 million. Anglers traveled an estimated 2.18 million miles (round trip). The yield value of fish harvested by sport fishing was approximately $1.88 million.

An additional early-season survey was conducted during March 1 to March 31 at Waukegan Harbor, Montrose Harbor and Calumet Park for pedestrian anglers and Waukegan Harbor and Calumet Park for launched-boat anglers. Anglers from both groups harvested an estimated 1,135 yellow perch, 67 brown trout, and 47 coho salmon in an estimated total of 3,849 hours of fishing during March. Total expenditures for boats, motors, trailers and fishing gear during March were estimated at $4,348.

INTRODUCTION

This report summarizes results of a survey of sport fishing in the Illinois portion of Lake Michigan from April 1 to September 30, 2013. All types of legal sport fishing during that period, with the exceptions of charter-boat fishing and smelt fishing, were covered by the survey. A supplemental survey of the early spring fishery from March 1 to March 31 was also conducted. The intent of the project was to provide estimates of sport fishing effort, harvest, and quality, as well as estimated fishing-related expenditures for anglers fishing Illinois waters of Lake Michigan. Biological data concerning length, weight, sea lamprey wounding and scarring, and marks (fin clips and external tags) were also collected from angler-harvested fish. Creel surveys for the Illinois portion of Lake Michigan have been conducted annually by the Illinois Natural History Survey since 1985; results from the first twenty-eight years of these surveys have been reported in annual technical reports, most recently for the 2012 survey (Brofka et al. 2013). Prior to these annual surveys, the most recent creel survey of this type in Illinois was conducted in 1979 by the Illinois Department of Conservation (Muench 1981).

Geographic setting

This survey occurred at access locations along the 63-mile Illinois shoreline of Lake Michigan (Figure 1), a highly-developed stretch of shoreline. Chicago covers roughly one-third of the Illinois shore, and a series of smaller cities cover most of the remainder. No significant tributary streams enter Lake Michigan in Illinois waters. The slope of the near-shore lake bottom is steeper in the northern part of Illinois waters than near Chicago, which forces boaters

from Chicago to go considerably farther from shore to reach good salmon waters (deep and cold) during the summer than boaters departing from North Point Marina. Another geographic feature is the easy access to other states' waters for boaters (e.g., Wisconsin waters for boaters launching at North Point Marina and Indiana waters for anglers launching at Calumet Park). For this survey interview data were assumed to represent anglers fishing in Illinois waters.

Figure 1. The Illinois shoreline of Lake Michigan.

METHODS

Non-charter angling activity was categorized into two groups that were evaluated separately: (1) Pedestrian and launched-boat anglers, for which data were generated via personal interviews and direct head counts, and (2) anglers using moored boats. The data presented here are based on extrapolating estimates for anglers using launched boats using data quantifying the distribution of moored-boat angling relative to launched-boat angling.

Pedestrians and launched-boat anglers

Effort and harvest were estimated for pedestrian and launched-boat anglers using selected primary fishing areas (i.e., selected shore access locations and boat ramps), and those estimates were extrapolated to other areas. For each primary fishing area, a modified stratified random sampling design similar to that suggested by Malvestuto (1996) was used. The primary sampling unit of the survey was the fishing day. Daily estimates (e.g., total harvest by species, expenditures by category, etc.) for each primary site were combined to estimate seasonal totals using the formula for stratified random samples given by Cochran (1977).

Use of primary fishing areas

The primary fishing areas for pedestrian anglers were North Point Marina (Winthrop Harbor), Waukegan Harbor (Waukegan), and four locations in Chicago: Montrose Harbor, Belmont Harbor, Jackson Park, and Calumet Park. The primary fishing areas for launched boats were boat ramps at North Point Marina (Winthrop Harbor), Waukegan Harbor (Waukegan), Diversey Harbor (Chicago), and Calumet Park (Chicago). For each day scheduled to be surveyed, a creel clerk was assigned to visit three areas, two pedestrian areas and one launch area, in a prescribed order. The three areas were always one of three groups: (1) Waukegan Harbor (pedestrians), North Point Marina (pedestrians), North Point Marina (launched boats); (2) Montrose Harbor (pedestrians), Belmont Harbor (pedestrians), Diversey Harbor (launched boats); and (3) Jackson Park (pedestrians), Calumet Park (pedestrians), Calumet Park (launched boats). Additional visits to the launch ramps at Waukegan Harbor were added to the design in 2006 and were surveyed in the same manner as the launch ramp sites in the three groups. Estimates obtained for the primary fishing areas were extrapolated to all other areas of the Illinois shoreline based on the distribution of pedestrian anglers and boat trailers. Data describing these distributions were obtained via an annual series of aerial counts during helicopter flights (conducted on six weekends during the spring and summer of 2013). During each flight, pedestrian anglers were counted and recorded on a form divided by site and the type of pedestrian site: structure (piers and breakwalls), shore (shoreline) and harbor (inside enclosed harbors). Pedestrian anglers who were not at a recognized site were counted and listed in the vicinity of the closest recognized site; the sum of these became the total for "other areas" on the form. Boat trailers with a vehicle attached were counted in the parking lots of launch ramps and were listed on the form at the appropriate site. All of the data collected were combined for the season and averaged, and converted to percentages (Table 2). To increase confidence, distribution data for the last 10 years were included for the purpose of extrapolating estimates from primary fishing areas.

Distribution of fishing

Pedestrians and launched boats

The aerial survey documented angler use of 24 fishing areas (in addition to "other" areas; Table 2). In 2013, these 24 areas accounted for 96.9% of the pedestrian anglers observed in the aerial surveys and 100% of the boat trailers parked near launch areas. Boats launched from the Calumet Yacht Club were not included in this survey (located in Illinois, but boats must leave the marina via Indiana waters). Interviews for the creel survey were conducted at six pedestrian fishing areas that accounted for 82.4% of the pedestrian anglers observed during the helicopter flights and four launch areas that accounted for 85.6% of the boat trailers observed near launch areas.

Table 2. Distribution of pedestrian anglers and boat trailers along the Illinois shoreline of Lake Michigan, determined by helicopter flights in 2013.

Area	Pedestrian anglers (%)	Boat trailers (%)
1. IL Beach State Park & North Point Marina	0.9	50.5
2. Waukegan Harbor and breakwalls	2.3	27.7
3. Great Lakes Naval Training Station	0.4	0.5
4. Forest Park	0.0	0.5
5. Central Park	0.0	0.0
6. Winnetka (Lloyd and Tower Parks)	0.1	0.9
7. Wilmette Harbor	0.0	NA
8. Northwestern Univ. and Dawes Park	0.6	7.2
9. Farwell Avenue pier	1.3	NA
10. Hollywood Avenue pier	0.1	NA
11. Foster Avenue pier	1.3	NA
12. Montrose Harbor and breakwalls	68.7	NA
13. Belmont Harbor	2.5	NA
14. Diversey Harbor and breakwalls	3.2	5.9
15. North Avenue pier	0.0	NA
16. Navy Pier	0.0	NA
17. Monroe Street breakwalls	0.7	NA
18. Burnham Harbor and vicinity	4.8	3.6
19. McCormick Place seawall	0.4	NA
20. 31st Street Marina	0.6	1.6
21. 50th Street access area	0.0	NA
22. 59th Street Harbor	0.9	NA
23. Jackson Park Harbor and breakwall	7.4	0.2
24. Calumet Park	0.6	1.6
25. other areas	3.1	0.0

Moored boats

In the Illinois portion of Lake Michigan, boats are moored at several locations: North Point Marina, Waukegan Harbor, Great Lakes Naval Training Station, Wilmette Harbor, and the Chicago Park District harbors. The number of power boats kept at moorings was used as an index of fishing activity from moored non-charter power boats (Table 3). Some fishing may occur from sail boats, but we assumed that it was a negligible portion of all fishing. Two private lift services (referred to as I/O service in Table 3) were included in the survey: Larsen Marine at

Waukegan Harbor and Skipper Bud's at North Point Marina. Boats kept at moorings or on land (lift service) in the Calumet or Chicago River systems were assumed to represent a negligible portion of fishing activity and were not included.

Table 3. Mooring locations along the Illinois shoreline of Lake Michigan and numbers of non-charter power boats moored at each location, as determined by the marinas and port authorities. Total number of power boats per port in bold.

Mooring area	Number of power boats
North Point Marina	**595**
Public Moorings	524
Skipper Bud's I/O service	71
Waukegan Harbor	**324**
Public Moorings	229
Larsen Marine I/O service	95
Great Lakes Naval Training Station	**20**
Wilmette Harbor	**102**
Chicago Park District	**2,744**
Diversey	682
other harbor moorings	2062

Early spring survey

Only two groups of sites were surveyed in the month of March. A group in Lake County consisted of Waukegan Harbor (pedestrians) and Waukegan Harbor (launched boats). A Chicago group consisted of Montrose Harbor (pedestrians), Calumet Park (pedestrians), and Calumet Park (launched boats). Virtually all the open boat ramps and the areas of heaviest concentrations of open water pedestrian anglers this early in the season were included in these groups (based on personal observations and previous surveys). Effort, harvest, and expenditures by moored-boat anglers were not estimated in the March survey because very few boats are at moorings at that time.

Selection of dates in a stratified random sample

The creel survey season (1 April through 30 September 2013, representing the major portion of fishing activity) was stratified by segment (three-week time periods) and type of day (weekends and holidays, or weekdays). The following 18 strata were formed:

1. Week days 4/1 - 4/21
2. Weekend days 4/1 - 4/21
3. Week days 4/22 - 5/12
4. Weekend days 4/22 - 5/12
5. Week days 5/13 – 6/2
6. Weekend days 5/13 - 6/2
7. Week days 6/3- 6/23
8. Weekend days 6/3- 6/23
9. Week days 6/24 - 7/14
10. Weekend days 6/24 - 7/14
11. Week days 7/15 – 8/4
12. Weekend days 7/15 – 8/4
13. Week days 8/5 - 8/25
14. Weekend days 8/5 - 8/25

15. Week days 8/26 - 9/15 16. Weekend days 8/26 - 9/15
17. Week days 9/16 - 9/30 18. Weekend days 9/16 - 9/30

For each of the three groups of sites, four survey dates were selected at random within each stratum, with the restriction that all three groups were sampled at least one week day (Monday through Friday) and one weekend day each week. For stratum 17 and 18, which were several days shorter than the others, fewer than four dates were selected for each group of sites. All three sites in each group were visited on the dates selected for that group. In addition to the surveys conducted at the three groups of sites, the launch ramps at Waukegan Harbor were surveyed three times per stratum, except during strata 17 and 18, when only 2 visits were made in each stratum.

The early spring survey was treated in a similar fashion to the core survey except that the segment duration was the entire month of March.

1. Week days 3/1 - 3/31 2. Weekend days 3/1 - 3/31

Data collection

Data were collected via two methods at each site: interviews during a two-hour period, and counts at the beginning and end of the two-hour period. Additionally, at boat launch sites, the arrival times of returning boats were recorded for all boats (whether interviews were conducted or not). Each interview was designed for one angling party i.e., one or more anglers fishing together) to increase the number of angling parties that could be interviewed and to minimize redundant questions within angling parties. At the eight pedestrian sites, the two-hour interview period was either 0600 to 0800 or 0830 to 1030. At the boat launch sites, the two-hour period was always 1100 to 1300. For pedestrian sites, individual anglers were counted at the beginning and end of each two-hour period. For boat launch sites, trailers (with vehicles attached, excluding personal watercraft trailers) were counted.

Creel clerks (who conducted the interviews) gathered information related to effort (number of angler-hours, number of angler-trips), expenditures for the present fishing trip (by category: major = boat, motor, or trailer; minor = fishing gear), distance driven to fishing locations (in miles, round-trip), harvest (by species), and species sought by angling parties. The species sought by anglers were grouped into four categories: Salmonids (including salmon and trout), yellow perch, other species (any species or group of species – e.g., “bass” – except salmonids and yellow perch), and unspecified (when the angling party was not targeting a specific species or group, i.e., “anything that bites”). Clerks also weighed and measured fish in possession of the anglers, noted whether each fish had sea lamprey wounds and scars, and noted any tags or marks (including clipped fins). The instructions to, and data form used by, creel clerks are in (Brofka and Czesny, 2008).

Variables measured for each date

Data collected during interviews were used to estimate the following variables for each date at each site: (1) Harvest per angler-hour, determined for each species by dividing the number of fish harvested by all parties interviewed by

the number of hours of fishing by individuals in those parties; (2) Expenditures per angler-trip, categorized into major and minor categories. For all expenditures, total expenditures by all anglers interviewed were divided by the number of anglers interviewed; (3) Distance traveled (by automobile) per angler-trip. As for expenditures, the total, round-trip miles traveled by all anglers interviewed were divided by the number of anglers interviewed; (4) Angler-hours (i.e., total time spent fishing by all anglers; see following paragraph); (5) angler-trips (i.e., total number of anglers who fished; see following paragraph); (6) Total harvest was calculated for each species as harvest per angler-hour multiplied by angler-hours; and (7) total expenditures were determined for each category as expenditures per angler-trip multiplied by angler-trips.

Angler-hours and angler-trips were determined differently for pedestrians and boaters. For pedestrians, angler-hours was calculated by multiplying the average number of anglers (from counts at the beginning and end of each two-hour period) by the number of hours in the day (from 0.75 hour before sunrise to 0.75 hour after sunset), and angler-trips was calculated as angler-hours divided by the average duration of a pedestrian fishing trip (mean of 3.87 hours for all pedestrian interviews in 2013). The number of angler-trips for anglers using launched boats was estimated by multiplying the number of anglers returning on boats during the two-hour interview period by the ratio of the number of all boats returning in a day to the number returning between 1100 and 1300. By monitoring all boat traffic at North Point Marina on 6 days in 2013, that the number of boats returning all day was estimated to be 3.274 times the number returning during 1100 to 1300 interview period. Launched-boat angler-hours were estimated by multiplying the number of angler-trips by the monthly mean trip duration. To smooth unrealistic differences between months, estimates of angler-trips were multiplied by the ratio of the annual mean to monthly mean of estimated anglers per trip. Estimates of angler-hours were multiplied by both this ratio and the ratio of annual mean to monthly mean of hours per trip. In 2013, the annual mean number of anglers per boat was 2.56, and the annual mean trip duration for boat anglers was 5.73 hours.

Expansion of daily estimates

The formula given by Cochran (1977) for stratified random samples was used to expand daily estimates to seasonal site-specific estimates of effort, harvest, and expenditures. A different set of strata were used for expansion of estimates: we used month-long segments (e.g., April, May, June), each divided into weekend days and week days (instead of the three-week segments described above).

Extrapolation to other areas

Extrapolations of seasonal estimates from primary fishing areas to other areas were based on the distributions of pedestrian anglers and boat trailers (assumed to reflect the distribution of launched-boat anglers; Table 2). Harvest, effort, and expenditures at areas not visited were estimated by extension of estimates for the nearest primary fishing areas. Thus, for pedestrian anglers, estimates for Waukegan Harbor were extended to all other areas north of and including Wilmette Harbor (except North Point Marina); estimates for Montrose Harbor were extended to all remaining areas north of Belmont Harbor; estimates for Belmont Harbor were extended to all remaining areas north

of the Monroe Street breakwalls; estimates for Jackson Park were extended to all areas south of Monroe Street except for Calumet Park. For launched boats, estimates for Waukegan Harbor were extended to all launch ramps north of Wilmette (including the "other" areas listed in Table 2, but excluding North Point Marina); estimates for Diversey were extended to Dawes Park; and results for Calumet Park were extended to the ramps at Jackson Park, 31st Street Harbor, and Burnham Harbor.

Moored boats

Effort, harvest, and expenditure estimates for anglers using moored boats were extrapolated from calculations for launched boats. First, the ratios of moored fishing boats to launched fishing boats for North Point Marina and Diversey Harbor were estimated: On three dates during the spring and summer of 2013 the numbers of fishing boats returning to moorings were counted while, simultaneously, the numbers of fishing boats returning to the launch ramp were also counted. Charter boats were excluded from these counts. Due to low numbers of returning boats, the ratios of moored to launched boats were estimated using data from 2008-2013. These ratios were 0.813 in North Point Marina and 0.769 in Diversey Harbor.

Using these figures, seasonal estimates of effort, harvest, and expenditures by anglers using launched boats at North Point, Waukegan (ratio assumed to be equal to North Point Marina), and Diversey harbors were extrapolated to moored boats. Thus, for example, the moored boat effort at North Point Marina for a given segment was estimated to be the launched boat effort for that segment multiplied by 0.813. Based on the distribution of moored power boats, estimates for Waukegan Harbor were extrapolated to boats moored in Wilmette Harbor and Great Lakes Naval Training Station, and the estimates for Diversey Harbor were extrapolated to all other boats moored in Chicago.

Changes in creel survey methods

Creel survey methods have varied during the past twenty-eight years of the creel survey, so comparisons should be made with caution. The influences of changes in methods will continue to be evaluated.

Confidence intervals and bias

Estimates of harvest, effort, and expenditures are presented without confidence intervals, as we have not fully evaluated bias in our estimates. Although we have collected and will continue to collect data with which to partially assess biases, assessing potential impacts on estimate precision is not possible at this time.

Yield values

The term “yield value” is used in this report to describe the hypothetical market price of fish harvested by anglers (if sold as fillets). To estimate the yield value, the estimated harvest for each species was multiplied by the estimated mean weight of that species to produce an estimated round weight. That round weight was then multiplied by 0.4 (assuming 60% loss in filleting process in keeping with previous years’ estimates; e.g., Brofka et al. 2013) to

produce the harvested marketable weight for each species. The marketable weight for each species was then multiplied by species-specific prices (approximated using prices observed on the internet by C.R. Roswell, November 2013) to produce the market value of the 2013 harvest for each species.

Missing data

On some dates creel clerks were unable to complete their assigned interviews. When data were missing from some of the assigned dates in a stratum, estimates for the stratum were based only on data from the surveyed dates. Thus, the sample size was smaller in these cases than for strata in which all interview sets were completed, and the resulting estimates were not as precise as estimates derived from full data sets. In 2013, three scheduled dates were not sampled: one date in strata 1 and two dates in strata 16. Additionally, one scheduled pedestrian site was not surveyed on each of two dates, both during strata 16.

Alternate sites/altered sites

Unforeseen circumstances (e.g. construction) have caused one or more primary sites to be closed or less accessible during part or all of many past sampling seasons. In 2013, there were no major disruptions. However, the boat ramps at Waukegan Harbor were closed April 1-5 due to dredging in Waukegan Harbor, and the fishing pier at North Point Marina was not in place (and therefore not available for use by anglers) before mid-April.

RESULTS

Overview

Estimates reported here are rounded; this may result in values for “totals” that differ slightly from the sum of individual values. For simplicity, the words "approximately" or “estimated” are not repeated with each estimated value. Detailed results for 2013 are presented in Tables 4 - 10. Tables 4 and 5 list seasonal harvest and effort (angler hours) estimates for anglers. Tables 6 and 7 present effort and harvest for each segment. Table 8 provides yield values. Table 9 lists fin clip abbreviations; fin clips observed by our creel clerks are listed in Table 10, with the number of occurrences of each clip or clip combination listed by species. Table 10 can assist in determining the contributions of different stockings of fish to the sport fishery in the Illinois portion of Lake Michigan. Tables 11 and 12 report angler trips and expenditures among angler types and among years. Tables 13 and 14 compare angler hours and harvest by fish species between angler types and for each year. Table 15 compares minor fish species harvest for each year.

Total non-charter sport fishing effort in the Illinois portion of Lake Michigan during the study period was 382,395 angler-hours. Harvest for major species included 53,107 yellow perch, 36,239 coho salmon, 6,423 Chinook salmon, 3,154 rainbow trout, 2,962 lake trout and 5,015 brown trout (Table 4). Anglers spent $1.48 million during the study period for boats, motors, trailers, and fishing gear used on Lake Michigan fishing trips (Table 11). Anglers fishing

Lake Michigan drove 2.18 million miles (round trip) during April-September, 2013 (Table 11). The Illinois sport fishing harvest was estimated to have a yield value of $1.88 million (Table 8).

Pedestrian fishing

From April 1 - September 30, 2013, pedestrian anglers spent 172,865 hours fishing in 44,709 trips to Lake Michigan (Table 4, Table 11). Yellow perch comprised the largest portion of the pedestrian harvest (43,314 fish; Table 4). Coho salmon were the most important salmonid species for pedestrian anglers, with a harvest of 3,118 (Table 4). Pedestrian anglers spent $300,173 (mean = $6.71 per trip) for fishing gear and drove 891,196 miles (mean = 19.9 miles per round trip – to and from the lake shore; Table 11).

Boater fishing

Anglers using launched or moored boats made 36,575 trips to Lake Michigan (Table 11) and spent 209,530 hours fishing (Table 4). The most abundant components of boater harvest were coho salmon (33,121), yellow perch (9,793), Chinook salmon (5,132), and brown trout (4,356; Table 4). North Point Marina accounted for 51.8% of the lake trout, brown trout, rainbow trout, Chinook salmon, and coho salmon taken by all anglers who used boats (Table 4). Anglers launching at Calumet Park accounted for 45.0% of the yellow perch harvested by boat anglers (Table 4). Total, fishing-related expenditures by anglers using boats were $1,175,010 ($32.13 per trip), with 63.9% of that amount going for boats, motors, and trailers (Table 11). Boaters drove 1,285,864 round-trip miles (35.2 miles per trip; Table 11).

Yield values

The estimated yield values of the three most valuable (in total yield) sport species were $883,058 for coho salmon, $602,525 for Chinook salmon, and $154,941 for yellow perch (Table 8). Aside from yellow perch harvested from the Wisconsin portion of Green Bay, none of the species listed in Table 8 are currently commercially available from Lake Michigan. Therefore, the values of all species are estimated from the retail prices for fish that are farm-raised or commercially-harvested in other waters. An estimated price for brown trout fillets was not available, so the price for lake trout fillets was used to estimate the yield value of brown trout.

Comparisons with preceding years

Compared to 2012, total angler fishing effort decreased by 17.8% in 2013 (Table 13). Boater effort decreased 18.7%, slightly more than pedestrian effort, which declined 16.6% (Table 13). Angler harvest rates for salmonids (number of fish per angler hour) decreased compared to 2012 for boat anglers, but increased for pedestrian anglers (Figure 2a). Boat angler harvest rates for yellow perch increased compared to 2012, while pedestrian angler harvest rates for yellow perch decreased (Figure 2b).

The yellow perch harvest of 53,107 was a decline of 43.4% from the 2012 harvest (Table 13 and Figure 4). The average weight of yellow perch kept by anglers decreased to 206 g (0.45 lb.; Table 8), while average length

increased slightly to 253 mm (Figure 5). In stark contrast to some recent years, yellow perch fishing for boat anglers was essentially nonexistent near Waukegan in 2013 (no boater harvest documented by this survey; Table 7). Most of the boat harvest of yellow perch occurred during July, especially near Calumet Park (anglers with an Indiana license can harvest yellow perch in waters adjacent to Calumet Park during July). Pedestrian harvest of yellow perch peaked in June (65.6% of pedestrian harvest), and most of the pedestrian harvest for the entire period occurred at Montrose Park (71.0% of overall pedestrian harvest; Table 6).

The 2013 harvest of coho salmon decreased by 25.8% compared to 2012 (Table 13 and Figure 7). Weight (1,680 g, or 3.70 lb.) of creeled coho salmon increased 17.8% and length (550 mm) increased 3.4% compared to 2012 (Table 8 and Figure 8). The majority (82.5%) of the harvest occurred in May and June (Tables 6 and 7).

The Chinook salmon harvest was 6,423 fish for 2013, a decrease of 53.0% from 2012 (Table 13 and Figure 9). Average length was 706 mm, a decrease of 4.0% compared to 2012, but the average weight increased 7.5% compared to2012, to 4,536 g (10.00 lb.; Table 8 and Figure 10). Most (86.2%) of Chinook salmon harvest occurred in July, August and September (Tables 6 and 7).

The 2013 harvest of lake trout was 2,962, an18.5% decline from harvest in 2012 (Table 13). The average weight decreased by 2.1% and average length increased by 0.9% compared to 2012 (Table 8). Lake trout harvest peaked twice: June accounted for 35.3% of the harvest, while a secondary peak occurred in August (28.4% of total harvest; Tables 6 and 7).

The 2013 brown trout harvest (5,015) increased drastically (by 319.7%) from 2012 (Table 13). The average length (534 mm) increased by 3.2% compared to 2012 and the average weight of 2,092 g (4.61 lb.) increased by 32.4% (Table 8). The vast majority (95.8%) of the harvest occurred in April (Tables 6 and 7).

The 2013 rainbow trout harvest (3,154) decreased from 2012 by 32.6% (Table 13). The average length of 650 mm was a decrease of 0.8% compared to creeled rainbow trout in 2012, while weight (2,847 g, or 6.27 lb.) increased 4.7% (Table 8). More harvest occurred in July and August than in other months (69.3%; Tables 6 and 7).

Estimated expenditures for boats, motors, and trailers decreased by 55.0% compared to 2012 (Table 11). Minor expenditures (i.e., fishing tackle) decreased by 38.5% and total mileage decreased by 10.0%.

The 2013 early spring (March) survey saw a decrease of 85.2% in effort compared to March of 2012. Consequently, harvest of all major species was lower than for March of 2012: yellow perch harvest decreased 87.2%, brown trout harvest decreased 96.3%, and coho salmon harvest decreased 98.5%. No harvest of rainbow trout (March 2012 harvest of 41) or lake trout (March 2012 harvest of 21) occurred in 2013 (Table14).

Minor species

In addition to the species for which results are presented in detail in Tables 4 - 14 (commonly-encountered salmonids and yellow perch), creel clerks reported the catch and/ or harvest of several other species by anglers (referred to here as "minor species"; Table 15). For some species, the total number of fish harvested (and total numbers caught) were estimated. For other species, very few fish were observed, so only the actual number observed in anglers' possession by creel clerks during interviews is reported. Most of these "minor" species were harvested in or near the harbors. Minor species harvested (total caught in parentheses) include: **freshwater drum**, 6,205 (6,678) ; **Rock bass**, 804 (2,956); **bluegill sunfish**, 546 (1,399); **common carp**, 208 (521); **smallmouth bass**, 68 (6,298); **largemouth bass**, 20 (2,129); **channel catfish**, 3 fish observed; **northern pike**, 4 fish observed; **lake whitefish**, 2 fish observed; anglers also caught **round gobies** (74 observed harvested; some were retained by anglers, most were not retained, e.g., fed to birds or used as bait).

DISCUSSION

Changes in the fishery and the creel survey in 2013

Unlike previous years (through 2011), estimates of vehicle fuel costs were not included in this report. Prior to 2012, an estimate of $0.10 per mile for fuel was applied to the total miles driven by anglers to and from creel locations. Due to rises in gas prices, this likely would underestimate the actual amount spent by anglers on vehicle fuel. One approach to estimating fuel costs, used by Melstrom and Lupi (2013) as part of a model estimating the value of Great Lakes recreational fishing, uses rates published annually by AAA (AAA 2013). Average gas cost reported by AAA was $0.1445 per mile in 2013 (AAA 2013). Melstrom and Lupi (2013) added $0.05 per mile for vehicles towing trailers to account for increased fuel consumption; employing this approach produces an estimate of $0.1945 per mile for vehicles towing trailers in 2013. Applying the average rate for pedestrian and moored boat anglers' round-trip miles, and the vehicle-with-trailer rate for launched boat anglers' miles, produces estimated fuel costs of $350,369 for all anglers fishing Illinois waters of Lake Michigan during April – September, 2013. This is slightly less than an estimated total of $381,478 in fuel costs for 2012 (using AAA's 2012 rate).

Angler effort

Total angler fishing effort (indexed by angler-hours) decreased 18.7% for boats and 16.6% for pedestrians compared to 2012. Effort has generally been declining since this survey began in 1986. While effort increased slightly from 2011 to 2012, effort in 2013 was similar to levels in 2011, suggesting the trend of decreasing angler effort has not reversed.

Yellow perch

Annual yellow perch harvests by anglers in Illinois have varied substantially over time. Estimated angler harvest was well over one million fish each year from 1986 through 1993 (except 1989). However, harvest fell to fewer than 600,000 in 1994, and by 1997 fell to well under 60,000 (driven in part by regulation changes and reduced

effort; Brofka and Dettmers, 1999). Harvest increased somewhat in 2001 (to 169,967) in response to increased effort and new regulation changes (repeal of an unprotected slot limit and moving the month closure from June to July). Yellow perch harvest generally increased from 2002 through 2009 to around 300,000. The mean April-September yellow perch harvest during 2004-2013 was 210,574. Harvest in 2013 decreased 41.8% from 2012 levels for pedestrian anglers and 49.6% for boat anglers; the estimated total harvest for April-September 2013 (53,107) was the third-lowest in the history of the survey and the lowest since 2000 (the final year of the slot limit). Overall effort directed at yellow perch decreased 43.1%, and overall HPE (harvest per angler effort expressed in fish-per-angler-hour) was 0.72 yellow perch per angler-hour, similar to 2012 HPE.

Coho salmon

Coho salmon consistently comprise the largest part of both the boat and pedestrian salmonid fishery. Coho salmon typically make up about 60% of the boater salmonid harvest, and in 2013 accounted for 67.4% of salmonids harvested by the overall non-charter angling fishery. The 2013 harvest of 36,239 coho salmon was 25.8% lower than harvest in 2012. Mean weight of harvested coho salmon during 2013 was 1,680 g, 10.8% heavier than the twenty-eight year mean.

Other salmonids

While the coho salmon harvest has traditionally dominated spring and early-summer salmonid harvest, other salmonids (especially Chinook salmon) often make up the majority of the harvest during mid-summer through early fall. Chinook salmon are popular, as they can attain very large sizes and provide anglers with a good fight. The annual Chinook harvest has fluctuated through time. Bacterial kidney disease (BKD) was blamed for die-offs of Chinook salmon beginning in 1988, resulting in reduced angler harvest of Chinook salmon, (as low as 2,900 fish in 1994). Chinook salmon have since been closely monitored in the hatchery and in the wild for BKD (Clark, 1996). Harvest in 2013 decreased by 53.0% (6,423) compared to 2012, and was below the ten year mean harvest (2004-2013) of around 10,584 fish. Mean weight increased 7.5% from to 2012 to 4,536 g (10.00 lbs.).

Lake trout harvest peaked in 1998 at 12,000, while the lowest harvest occurred in 2006 (653). Lake trout harvests have generally been lower for the last 10 years than during most previous years of this survey (1986-2003). The mean lake trout harvest for the past ten years is 1,739 fish. In 2013 the harvest was 2,962 fish, making 2013 the third consecutive year with harvest above the ten–year mean (though still below the twenty-eight year mean for the survey).

Brown trout are an important component of the spring salmonid fishery with a ten year mean harvest (2004-2013) of 2,513 fish. The 2013 harvest of 5,015 browns was an increase of 319.7% from the 2012 harvest, and the highest harvest since 1997. The mean weight increased from 2012 to 2,092 g (4.61 lbs.).

Rainbow trout are a component of the spring and summer fishery. Typically, most rainbow trout harvest occurs in the boat fishery. The average annual harvest for the past ten years has been 2,944. 2013 saw a decrease of 32.6% compared to 2012 with a harvest of 3,154 fish. The mean weight increased to 2,979 g (6.57 lbs.) in 2013, which is 4.7% heavier than the mean weight of rainbow trout harvested in 2012.

Minor species

Some species provide a smaller, yet consistent component of the fishery. The national B.A.S.S. tournament held at Burnham Harbor July 19 - 23, 2000 is evidence that anglers nationwide are aware of opportunities to catch black bass (smallmouth and largemouth bass) in the harbors and shoreline of the Illinois portion of Lake Michigan. Common carp and freshwater drum are targeted both by anglers fishing for food and catch-and-release anglers using European carp tournament fishing techniques. Panfish (other than yellow perch) are targeted or kept incidentally by pedestrian anglers; rock bass harvest has averaged about 3% of the annual yellow perch harvest for the last ten years, representing the largest component of the non-perch panfish fishery. Estimated harvests of rock bass and freshwater drum have generally been similar to estimates of harvest for brown, lake, and rainbow trout for the past 10 years. Approximately 8.0% of total angling effort was directed at minor species in 2013 (i.e., "other" recorded as the species sought during interviews).

Expenditures

Expenditures and mileage decreased in 2013. Major expenditures (i.e., boat, motor and trailers) decreased 55.0%, minor expenditures (i.e., tackle, bait, downriggers, etc.) decreased 38.5%, and mileage (round-trip, to and from access sites) decreased 10.0%. These estimates are consistent with a declining trend in expenditure estimates for the last decade.

Early spring (March) survey

Fishing effort and success during March is heavily influenced by the weather and the severity of the winter preceding March. For example, March of 2012 was one of the warmest on record for this region, resulting in the highest March angling effort of the last ten years, and above-average harvest of yellow perch, coho salmon, and brown trout. The preceding year (2011) was cooler, and ice limited angling at Waukegan Harbor, resulting in reduced effort, and subsequently low yellow perch and brown trout harvests. March 2013 was again relatively cool; of the last ten years of March surveys, 2013 would rank last for total angler effort and harvest of all salmonids, and would rank ninth for yellow perch harvest.

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Table 4. Effort (anglers-hours) and harvest (by species) by non-charter anglers in the Illinois portion of Lake Michigan during April-September, 2013. Wau. = Waukegan, Peds = Pedestrian.

		Effort			**Harvest**					
Type of angler	Area	Total hours	Target perch	Target salmon	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
Peds	North Point	2,546	40	83	0	0	0	0	0	0
	Wau. Harbor	11,705	1,358	7,906	17	42	18	0	138	337
	Montrose	92,096	44,513	23,337	30,735	334	24	0	2130	264
	Belmont	7,514	2,887	2,979	3,663	90	0	0	105	0
	Jackson	12,403	2,456	6,873	1,686	17	9	0	129	153
	Calumet	2,680	174	1588	0	65	0	0	86	0
	others	43,921	9,772	23,486	7,214	110	32	0	529	537
	TOTALS	172,865	61,200	66,252	43,314	659	83	0	3,118	1,291
Boat	North Point	88,804	48	86,042	0	141	2,373	1,871	17,070	3,732
	Wau. Harbor	56,688	2,337	53,161	0	3056	523	549	8,317	1,050
	Diversey	8,479	1,752	4,260	559	47	0	139	1,475	11
	Calumet	12,714	2,985	2,225	4410	56	9	0	646	0
	others	42,844	5,641	28,007	4,824	1,057	167	404	5,612	338
	TOTALS	209,530	12,763	173,695	9,793	4,356	3,071	2,962	33,121	5,132
Combined	TOTALS	382,395	73,963	239,947	53,107	5,015	3,154	2,962	36,239	6,423

Table 5. Effort (anglers-hours) and harvest (by species) by non-charter anglers at selected sites along the Illinois portion of Lake Michigan during March, 2013. Wau. = Waukegan, Cal. = Calumet, Peds = Pedestrian.

	Effort			**Harvest**					
Location	Total hours	Target perch	Target salmon	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
Wau. Harbor	1,094	0	1,034	0	67	0	0	12	0
Wau. Ramp	1,007	0	1,007	0	0	0	0	0	0
Montrose	954	0	954	0	0	0	0	0	0
Cal. Park Peds	314	0	314	0	0	0	0	16	0
Cal. Park Ramp	479	237	242	1,135	0	0	0	19	0
Total	3,849	237	3,551	1,135	67	0	0	47	0

Table 6. Effort and harvest for each month by pedestrian anglers of the Illinois portion of Lake Michigan during April-September, 2013. Wau. = Waukegan.

		Effort	Harvest							
Time Period	Area	Total hours	Target perch	Target salmon	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
April	North Point	69	0	0	0	0	0	0	0	0
	Wau. Harbor	1,290	0	1,159	0	21	12	0	0	0
	Montrose	7,850	34	7,449	0	327	6	0	393	0
	Belmont	1,858	0	1,650	0	90	0	0	79	0
	Jackson	2,285	56	2,139	0	17	0	0	92	0
	Calumet	1,395	54	1,260	0	65	0	0	86	0
	others	7,505	149	6,977	0	102	5	0	288	0
May	North Point	263	32	0	0	0	0	0	0	0
	Wau. Harbor	1,992	0	1587	0	21	6	0	119	0
	Montrose	13,775	3,303	7,613	4,847	7	18	0	1,703	0
	Belmont	622	110	105	276	0	0	0	0	0
	Jackson	1,329	0	406	0	0	9	0	37	0
	Calumet	401	0	141	0	0	0	0	0	0
	others	5,102	156	2,142	332	8	27	0	223	0
June	North Point	561	8	14	0	0	0	0	0	0
	Wau. Harbor	1,814	750	357	0	0	0	0	0	0
	Montrose	32,295	29,227	541	17,087	0	0	0	0	0
	Belmont	2,786	2,431	0	3,322	0	0	0	0	0
	Jackson	2,542	2,262	46	1,657	0	0	0	0	0
	Calumet	185	42	43	0	0	0	0	0	0
	others	9,879	8,263	348	6,353	0	0	0	0	0
July	North Point	387	0	0	0	0	0	0	0	0
	Wau. Harbor	926	13	466	0	0	0	0	0	0
	Montrose	12,586	3,771	154	2,354	0	0	0	0	0
	Belmont	639	68	0	0	0	0	0	0	0
	Jackson	375	127	0	29	0	0	0	0	0
	Calumet	300	77	54	0	0	0	0	0	0
	others	2,159	501	255	190	0	0	0	0	0
August	North Point	598	0	0	0	0	0	0	0	0
	Wau. Harbor	1,160	313	408	10	0	0	0	0	0
	Montrose	14,335	7,261	328	6,447	0	0	0	0	0
	Belmont	491	278	159	65	0	0	0	0	0
	Jackson	1,128	11	205	0	0	0	0	0	0
	Calumet	126	0	0	0	0	0	0	0	0
	others	4,248	566	831	337	0	0	0	0	0
September	North Point	668	0	69	0	0	0	0	0	0
	Wau. Harbor	4,523	282	3,931	7	0	0	0	19	337
	Montrose	11,255	916	7,252	0	0	0	0	34	264
	Belmont	1,116	0	1,065	0	0	0	0	25	0
	Jackson	4,743	0	4,077	0	0	0	0	0	153
	Calumet	273	0	89	0	0	0	0	0	0
	others	15,029	136	12,934	2	0	0	0	18	537

Table 7. Effort and harvest by anglers using boats of the Illinois portion of Lake Michigan during April-September, 2013. Wau. = Waukegan.

		Effort			**Harvest**					
Time period	Area	Total hours	Target perch	Target salmon	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
April	North Point	7,821	0	5,786	0	0	0	0	0	0
	Wau. Harbor	8,053	871	7,182	0	3,056	0	0	18	0
	Diversey	1,187	0	1,187	0	47	0	139	337	0
	Calumet	383	0	383	0	39	0	0	0	0
	others	4,809	217	4,591	0	1,042	0	237	583	0
May	North Point	17,380	48	17,196	0	32	279	40	11,032	158
	Wau. Harbor	13,948	0	13,280	0	0	132	0	5,411	24
	Diversey	763	0	299	0	0	0	0	111	0
	Calumet	3,595	0	733	0	17	0	0	503	0
	others	8,686	0	5,276	0	15	40	0	2,272	7
June	North Point	18,104	0	17,886	0	0	106	632	2,845	393
	Wau. Harbor	13,542	1,195	12,347	0	0	74	316	1,977	211
	Diversey	3,392	1,752	1,640	559	0	0	0	1,027	11
	Calumet	2,277	742	558	129	0	9	0	143	0
	others	11,906	4,021	7,062	1,070	0	31	96	2,482	84
July	North Point	17,354	0	17,354	0	74	1,208	326	2,446	1,552
	Wau. Harbor	8,907	0	8,907	0	0	178	102	874	285
	Diversey	763	0	0	0	0	0	0	0	0
	Calumet	3,295	1,744	90	4,281	0	0	0	0	0
	others	6,896	1,068	3,837	3,754	0	54	31	265	86
August	North Point	19,165	0	18,840	0	19	598	688	453	1,157
	Wau. Harbor	7,242	271	6,651	0	0	113	118	12	207
	Diversey	1,526	0	1,134	0	0	0	0	0	0
	Calumet	1,486	0	460	0	0	0	0	0	0
	others	6,110	112	4,913	0	0	34	36	4	63
September	North Point	8,980	0	8,980	0	16	182	185	295	473
	Wau. Harbor	4,997	0	4,794	0	0	25	13	25	323
	Diversey	848	0	0	0	0	0	0	0	0
	Calumet	1,678	499	0	0	0	0	0	0	0
	others	4,437	223	2,329	0	0	8	4	8	98

Table 8. Yield values of fish harvested by non-charter sport anglers in the Illinois waters of Lake Michigan during April - September 2013. All fish are assumed to be prepared as fillets with 60% waste. Prices for all except brown trout (used lake trout value) are those current in national markets in November, 2013.

Species	Total harvest	Av. wt. (lbs.)	Round wt. (lbs.)	Market wt. (lbs.)	Price per pound	Yield value
Yellow perch	53,107	0.45	24,078	9,631	$16.09	$154,941
Brown trout	5,015	4.61	23,130	9,252	$7.75	$71,704
Rainbow trout	3,154	6.57	20,717	8,287	$12.50	$103,586
Lake trout	2,962	6.67	19,758	7,903	$7.75	$61,249
Coho salmon	36,239	3.70	134,203	53,681	$16.45	$883,058
Chinook salmon	6,423	10.00	64,235	25,694	$23.45	$602,525

Combined yield value of all species: $1,877,062

Table 9. Fin clip abbreviations.

Name of fin or bone	Abbreviation
Adipose fin	ad
Dorsal fin	do
Left maxillary bone	lm
Right maxillary bone	rm
Left pectoral fin	lp
Right pectoral fin	rp
Left ventral fin	lv
Right ventral fin	rv

Table 10. Fin clip summary for salmonids harvested by non-charter anglers in the Illinois waters of Lake Michigan during 2013. Typically, only a portion of the salmonids stocked each year are marked. However, all stocked lake trout are clipped. Lake trout examined by clerks which exhibit no fin clips are one of four possibilities: 1. the lake trout is naturally produced (wild). 2. the lake trout failed to receive a fin clip in the hatchery. 3. the lake trout regenerated the missing fin or fins. 4. the clerk did not examine the lake trout thoroughly enough and missed the clip or clips.

	Species				
Clip	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
ad	0	0	6	2	59
ad, lm, rp	0	1	0	0	0
ad, rm	2	0	0	0	0
ad, lp	0	0	1	0	0
ad, rp	1	0	0	0	0
ad, rv	0	0	0	1	0
lm, rm	0	0	0	1	0
lp	0	0	10	0	0
lp, rv	0	1	2	0	0
rp	0	1	9	1	0
rp, lv	0	0	8	0	0
lv	0	0	8	0	0
rv	2	1	12	1	0
no clip	45	80	25	661	100

Table 11. Estimated number of angler trips and expenditures by non-charter anglers in the Illinois portion of Lake Michigan, during 2004 - 2013. In previous years, expenditure estimates were rounded to the nearest $1,000 (or 10,000 miles); 2013 estimates were rounded to the nearest whole-dollar amount (or mile). NA = not applicable.

		Effort	Expenditures		
Type of angler	Year	(angler-trips)	Major (boat)	Minor (gear)	Miles (travel)
Pedestrians	2004	79,062	NA	$882,000	1,360,000
	2005	85,449	NA	$574000	1,530,000
	2006	74,719	NA	$973,000	1,240,000
	2007	75,041	NA	$477,000	1,290,000
	2008	83,841	NA	$1,128,000	1,440,000
	2009	90,555	NA	$900,000	1,650,000
	2010	61,303	NA	$502,000	1,040,000
	2011	40,781	NA	$163,000	730,000
	2012	52,758	NA	$266,000	910,000
	2013	44,709	NA	$300,173	891,196
Boats	2004	42,205	$11,663,000	$1,140,000	1,560,000
	2005	37,582	$7,386,000	$636,000	1,390,000
	2006	52,277	$12,293,000	$2,116,000	1,740,000
	2007	42,034	$6,914,000	$600,000	1,040,000
	2008	47,636	$2,949,000	$1,469,000	1,360,000
	2009	41,349	$7,584,000	$624,000	1,230,000
	2010	55,701	$12,171,000	$895,000	1,760,000
	2011	37,061	$2,320,000	$532,000	1,230,000
	2012	44,863	$1,668,000	$912,000	1,510,000
	2013	36,575	$750,284	$424,726	1,285,864
Season Totals	2004	121,267	$11,633,000	$2,022,000	2,920,000
	2005	123,031	$7,386,000	$1,210,000	2,920,000
	2006	126,996	$12,293,000	$3,089,000	2,980,000
	2007	117,075	$6,914,000	$1,077,000	2,330,000
	2008	131,477	$2,949,000	$2,597,000	2,880,000
	2009	131,904	$7,584,000	$1,524,000	2,880,000
	2010	117,004	$12,171,000	$1,397,000	2,800,000
	2011	77,842	$2,320,000	$695,000	1,960,000
	2012	97,621	$1,668,000	$1,178,000	2,420,000
	2013	81,284	$750,284	$724,899	2,177,060

Table 12. March fishing effort and expenditures by non-charter anglers at selected sites in the Illinois portion of Lake Michigan, during 2004 – 2013. In previous years, expenditure estimates were rounded to the nearest $1,000 (or 1,000 miles); 2013 estimates were rounded to the nearest whole-dollar amount (or mile). NA = not applicable.

		Effort	Expenditures		
Type of angler	Year	(angler-trips)	Major (boat)	Minor (gear)	Miles (travel)
Pedestrians	2003	1,987	NA	$24,000	40,000
	2004	4,231	NA	$94,000	80,000
	2005	2,652	NA	$49,000	60,000
	2006	3,378	NA	$38,000	70,000
	2007	2,812	NA	$26,000	50,000
	2008	1,656	NA	$33,000	30,000
	2009	1,750	NA	$42,500	40,000
	2010	2,292	NA	$51,400	51,000
	2011	1,667	NA	$5,300	27,000
	2012	4,517	NA	$47,400	85,000
	2013	611	NA	$3,846	15,081
Launched Boats	2003	356	$0	$1,000	7,000
	2004	787	$0	$36,000	20,000
	2005	566	$0	$19,000	13,000
	2006	594	$0	$33,000	12,000
	2007	835	$0	$36,000	8,000
	2008	605	$0	$37,000	9,000
	2009	1,925	$514,000	$61,000	50,000
	2010	2,067	$993,000	$83,000	55,000
	2011	215	$1,599,000	$400	3,000
	2012	1,417	$0	$16,400	31,000
	2013	259	$0	$502	2,145
March Totals	2003	2,343	$0	$25,000	50,000
	2004	5,017	$0	$130,000	100,000
	2005	3,218	$0	$68,000	76,000
	2006	3,972	$0	$71,000	82,000
	2007	3,647	$0	$62,000	58,000
	2008	2,261	$0	$70,000	37,000
	2009	3,675	$514,000	$103,000	90,000
	2010	4,359	$993,000	$135,000	106,000
	2011	1,882	$1,599,000	$5,700	30,000
	2012	5,934	$0	$63,800	116,000
	2013	870	$0	$4,348	17,226

Table 13. Fishing effort and harvest by non-charter anglers in the Illinois portion of Lake Michigan, in 2004 - 2013. Estimates were rounded to the nearest whole number. Peds = Pedestrian anglers, Boat = Boat anglers.

		Effort	Harvest					
Angler type	Year	(angler-hours)	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
Peds	2004	287,683	169,212	1,474	436	16	4,301	2,790
	2005	307,076	275,632	1,294	250	0	2,211	2,459
	2006	276,536	188,535	692	304	0	348	2,734
	2007	251,912	216,437	1,110	311	34	491	2,543
	2008	284,555	144,144	1,854	395	0	2,179	2,313
	2009	325,802	147,941	745	507	0	2,366	2,922
	2010	231,121	93,986	630	384	0	4,712	1,755
	2011	169,723	33,071	664	312	0	4,759	1,155
	2012	207,171	74,406	878	22	12	67	1,464
	2013	172,865	43,314	659	83	0	3,118	1,291
Boat	2004	210,989	42,536	663	2,420	1,628	23,906	10,792
	2005	188,564	27,412	1,095	3,000	1,286	19,035	11,856
	2006	260,217	128,173	2,203	2,651	663	18,286	11,984
	2007	221,692	71,166	638	2,145	849	29,808	8,617
	2008	261,825	173,285	2,594	1,895	1,662	13,799	8,637
	2009	217,193	115,601	854	1,206	689	15,361	3,985
	2010	293,884	107,928	1,973	2,591	958	26,143	6,467
	2011	196,848	23,725	434	2,800	3,008	24,859	4,747
	2012	257,762	19,443	317	4,659	3,624	48,777	12,192
	2013	209,530	9,793	4,356	3,071	2,962	33,121	5,132
Season	2004	498,672	211,748	2,137	2,856	1,644	28,207	13,582
	2005	495,640	303,044	2,389	3,250	1,286	21,246	14,315
	2006	536,753	316,708	2,895	2,955	663	18,634	14,718
	2007	473,604	287,603	1,748	2,456	883	30,299	11,159
	2008	546,380	317,429	4,447	2,289	1,660	15,979	10,950
	2009	542,995	263,542	1,599	1,713	689	17,727	6,907
	2010	525,005	201,914	2,603	2,975	958	30,855	8,222
	2011	366,571	56,796	1,098	3,112	3,008	29,618	5,902
	2012	464,933	93,849	1,195	4,681	3,636	48,844	13,656
	2013	382,395	53,107	5,015	3,154	2,962	36,239	6,423

Table 14. March fishing effort and harvest by non-charter anglers at selected sites in the Illinois portion of Lake Michigan, in 2004 - 2013. Estimates were rounded to the nearest whole number. Peds = Pedestrian, Lau'd = Launched boat anglers.

		Effort	Harvest					
Angler type	Year	(angler-hours)	Yellow perch	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon
Peds	2004	18,848	170	1,396	360	0	469	0
	2005	11,244	492	762	85	0	173	0
	2006	11,560	0	1,467	65	0	259	0
	2007	9,819	373	764	0	0	386	0
	2008	5,940	261	347	52	0	797	0
	2009	6,296	108	160	85	0	84	0
	2010	8,642	0	549	97	0	65	0
	2011	6,937	28	15	75	0	292	0
	2012	17,941	4,103	915	0	0	1,941	0
	2013	2,363	0	67	0	0	28	0
Lau'd	2004	3,935	9,464	198	9	0	88	0
	2005	2,830	5,308	346	0	0	111	0
	2006	3,199	4,456	478	0	0	182	0
	2007	4,199	10,165	382	9	0	98	0
	2008	3,117	1,024	81	0	0	0	0
	2009	10,109	19,214	10	0	0	37	0
	2010	10,907	16,928	451	0	206	113	0
	2011	1,144	0	72	0	0	909	0
	2012	8,059	4,780	912	41	21	1,283	0
	2013	1,486	1,135	0	0	0	19	0
March Totals	2004	22,783	9,634	1,594	369	0	557	0
	2005	14,074	5,800	1,108	85	0	284	0
	2006	14,759	4,456	1,945	65	0	441	0
	2007	14,018	10,538	1,146	9	0	484	0
	2008	9,057	1,285	428	52	0	797	0
	2009	16,405	19,322	170	85	0	121	0
	2010	19,549	16,928	1,000	97	206	178	0
	2011	8,081	28	87	75	0	1,201	0
	2012	26,000	8,883	1,827	41	21	3,224	0
	2013	3,849	1,135	67	0	0	47	0

Table 15. Minor species harvest by non-charter anglers in the Illinois portion of Lake Michigan, in 2004 - 2013. Estimates were rounded to the nearest whole number.

Year	Smallmouth bass	Largemouth bass	Rock bass	Bluegill sunfish	Pumpkinseed sunfish	Common carp	Freshwater drum
2004	0	0	11,003	3,634	1,143	85	1,160
2005	124	18	9,512	848	601	268	3,921
2006	46	97	6,697	550	28	147	2,990
2007	252	49	10,650	269	20	154	1,965
2008	80	45	7,561	405	0	43	2,033
2009	76	0	3,934	298	0	240	1,482
2010	51	0	1,938	402	9	8	1,768
2011	0	4	575	309	0	238	2,946
2012	38	0	2,001	406	42	216	3,540
2013	68	20	804	546	0	208	6,205

Figure 2 (a). Salmonid harvest per unit effort, derived from the Illinois sport fishing surveys of Lake Michigan, 2004-2013

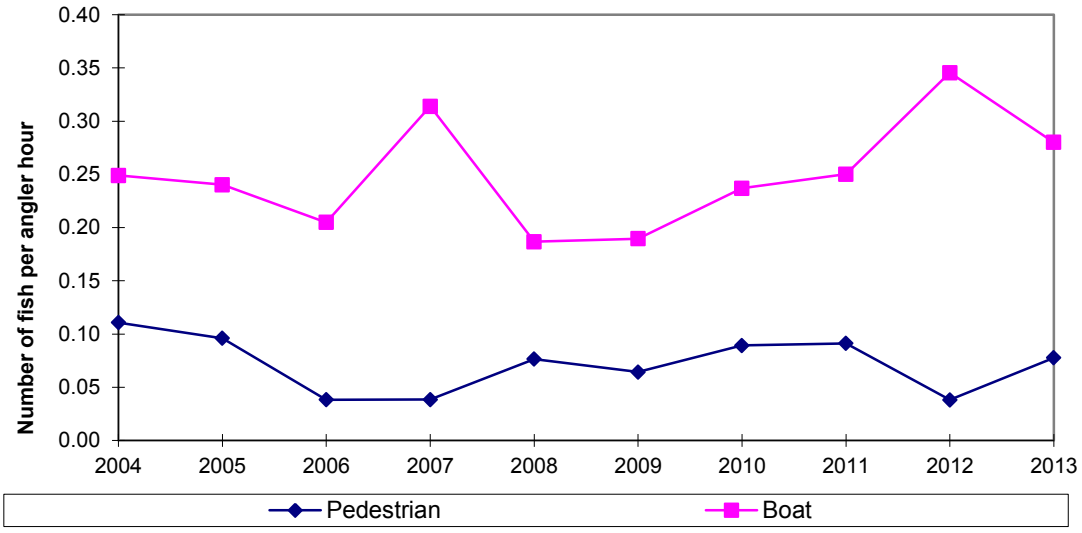


Figure 2 (b). Yellow perch harvest per unit effort, derived from Illinois sport fishing surveys of Lake Michigan, 2004-2013

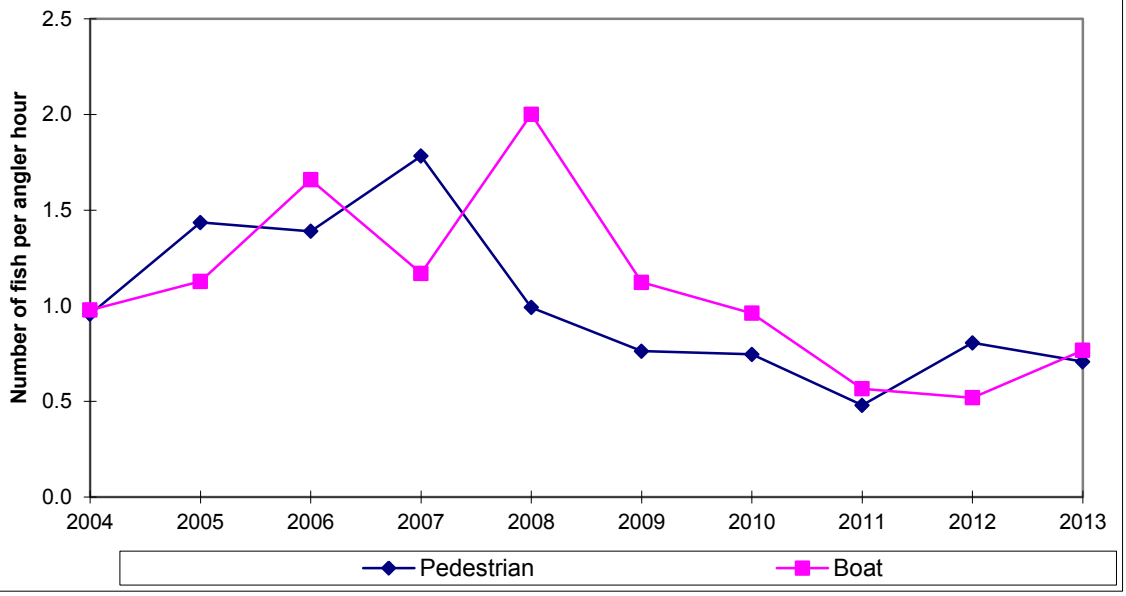


Figure 3 (a). Directed angler effort for salmonids in the Illinois portion of Lake Michigan, 2004-2013

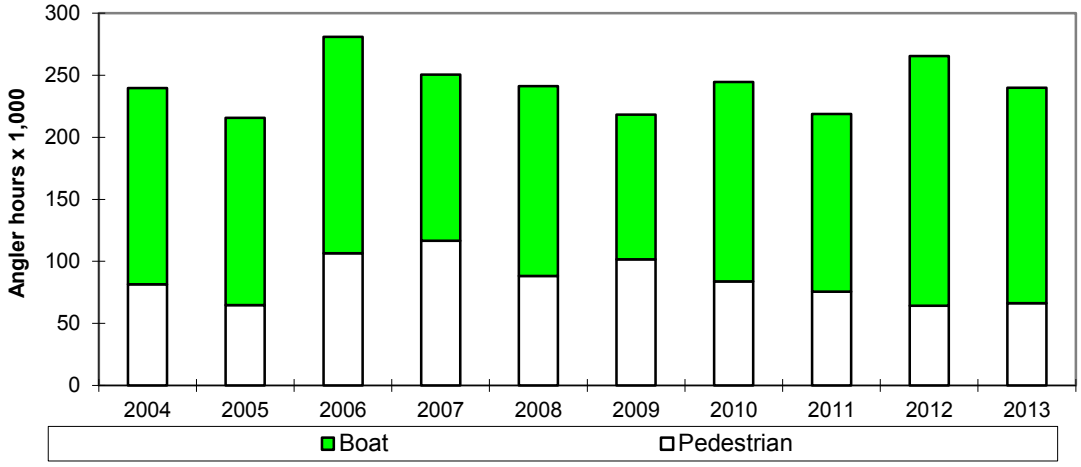


Figure 3 (b). Directed angler effort for yellow perch in the Illinois portion of Lake Michigan, 2004-2013

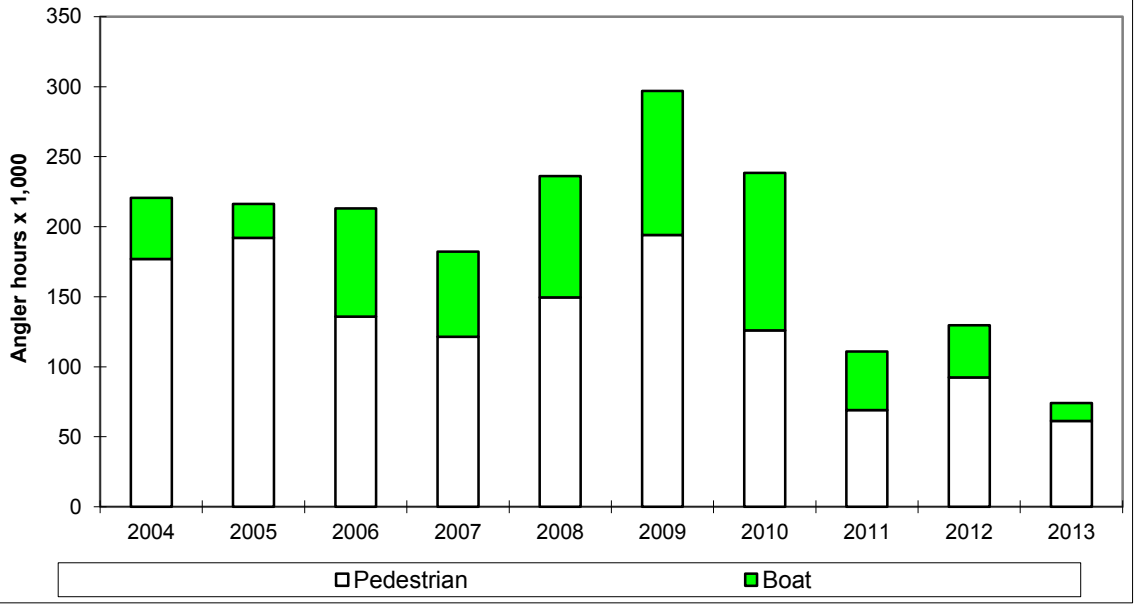


Figure 4. Total yellow perch non-charter sport harvest in the Illinois waters of Lake Michigan, 2004-2013

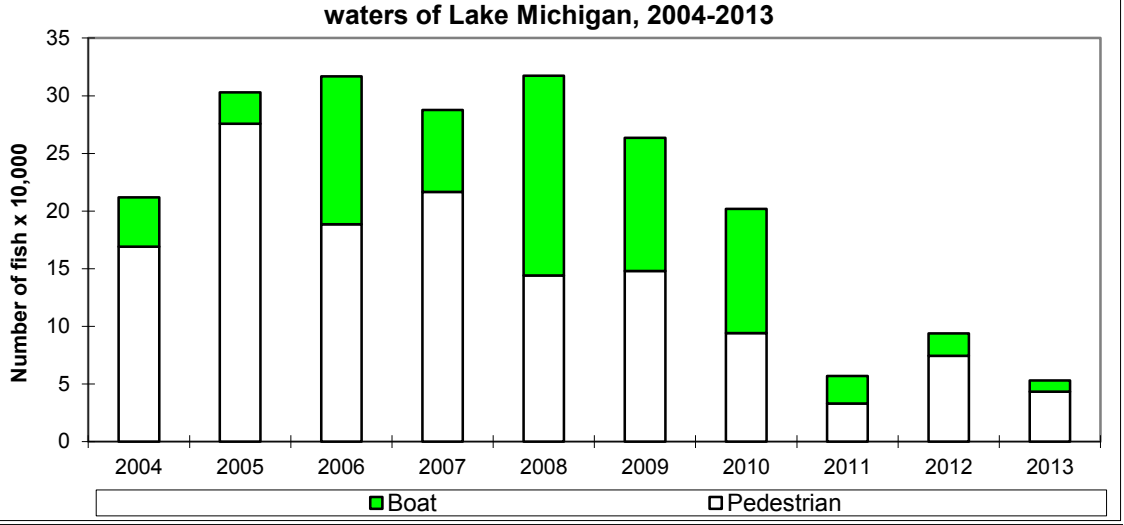


Figure 5. Average lengths of creeled yellow perch from the Illinois waters of Lake Michigan, 1986 - 2013

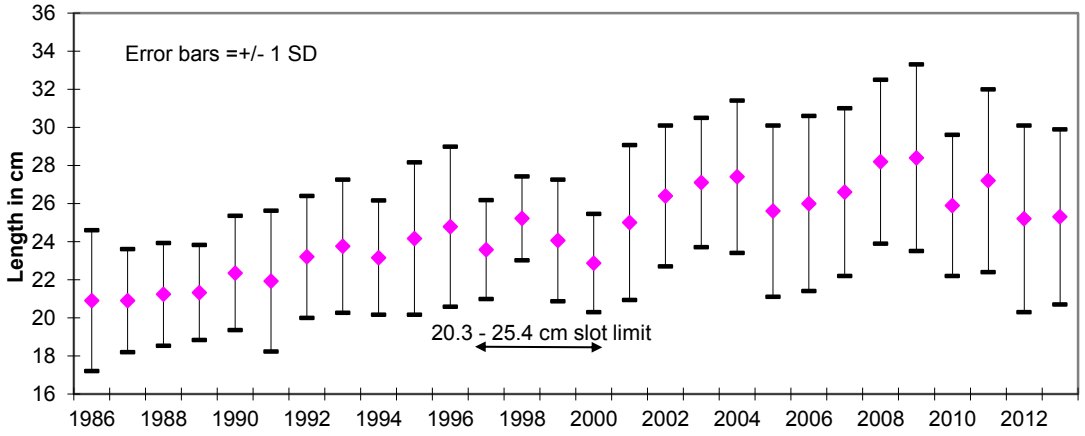


Figure 6. 2013 yellow perch sport harvest from the Illinois waters of Lake Michigan, per month

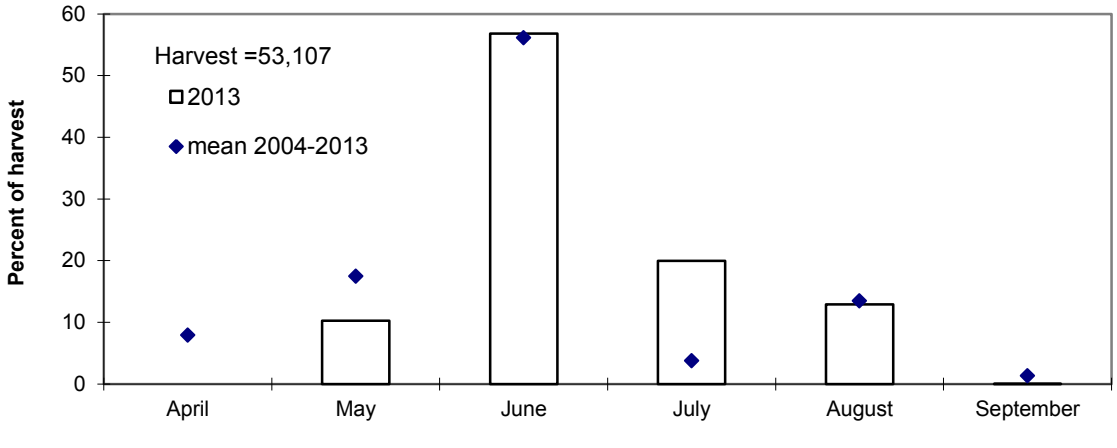


Figure 7. Total non-charter coho salmon sport harvest in the Illinois waters of Lake Michigan, 2004- 2013

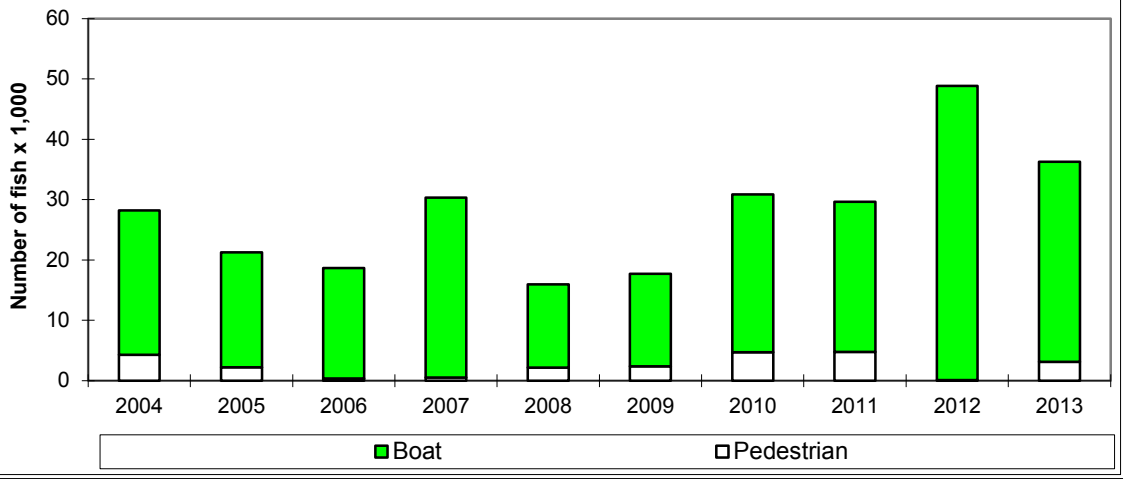


Figure 8. Average lengths of creeled coho salmon from the Illinois waters of Lake Michigan, 1986 - 2013

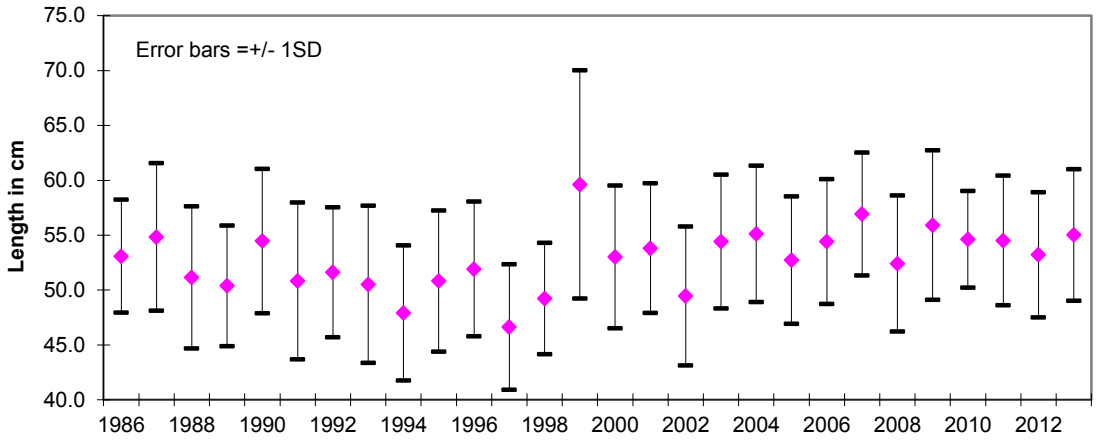


Figure 9. Total non-charter chinook salmon sport harvest in the Illinois waters of Lake Michigan, 2004-2013

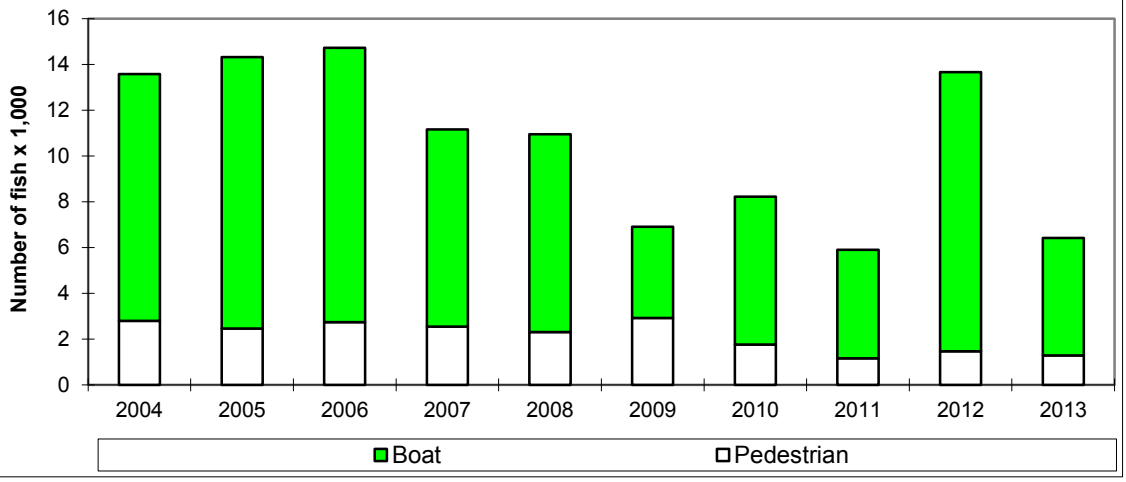
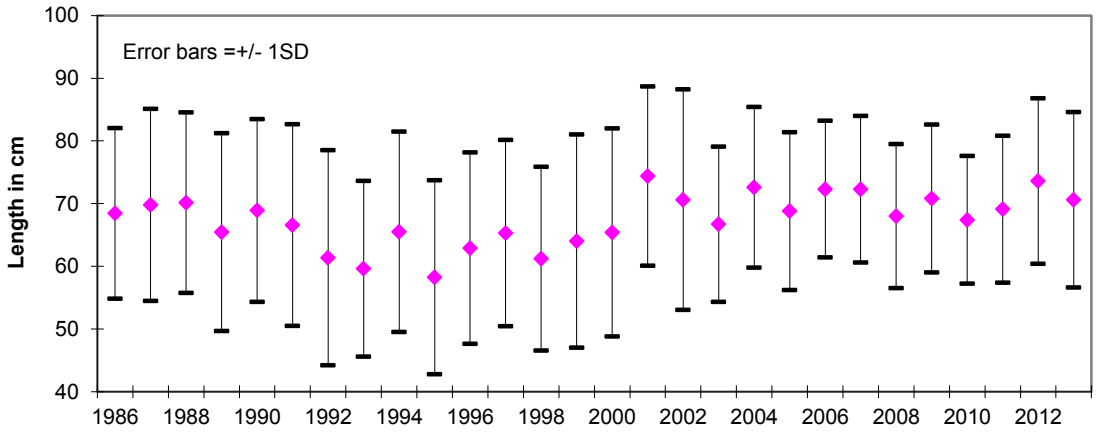


Figure 10. Average lengths of creeled chinook salmon from the Illinois waters of Lake Michigan, 1986 - 2013



APPENDIX A - COMPARISON OF THE CHARTER AND NON - CHARTER SALMONID BOAT FISHERY

The charter and non - charter boat salmonid fisheries were compared to evaluate whether the two groups target the same salmonid species (Tables A1 and A2). In general, composition of total harvest for both groups has been similar for the last ten years. Harvest-per-unit-effort (HPE) for both groups is presented in Figure A1; the charter fishery has generally exhibited higher success than the non - charter boat fishery (charter HPE approximately double non-charter HPE). The combined harvest of both charter and non - charter anglers (boats and pedestrians) for 2004 - 2013 is presented in Figure A2. These data represent only harvest and effort from April-September (early spring surveys are not included).

Table A1. Non-charter boat harvest composition (boats only) April – September 2004 - 2013.

	Effort	Percent of total harvest					
Year	(angler-hours)	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon	Total salmonids
2004	158,290	1.7	6.1	4.1	60.7	27.4	39,409
2005	151,010	3.0	8.3	3.5	52.5	32.7	36,272
2006	174,621	6.2	7.4	1.9	51.1	33.5	35,787
2007	133,974	1.5	5.1	2.0	70.9	20.5	42,057
2008	153,169	9.1	6.6	5.8	48.3	30.2	28.587
2009	116,514	3.9	5.5	3.1	69.5	18.0	22,095
2010	160,945	5.2	6.8	2.5	68.6	17.0	38,132
2011	143,331	1.2	7.8	8.4	69.3	13.2	35,848
2012	201,326	0.5	6.7	5.2	70.1	17.5	69,569
2013	173,695	9.0	6.3	6.1	68.1	10.6	48,642

Table A2. Charter boat harvest composition April – September 2004 - 2013.

	Effort						Percent of total harvest
Year	(angler-hours)	Brown trout	Rainbow trout	Lake trout	Coho salmon	Chinook salmon	Total salmonids
2004	110,284	1.7	3.3	4.3	62.3	28.4	51,359
2005	114,599	2.4	8.6	4.0	51.2	33.7	58,473
2006	99,698	1.2	5.5	2.5	54.0	36.7	51,753
2007	87,763	2.9	3.2	2.9	66.5	24.6	50,218
2008	91,756	2.9	5.2	4.6	59.4	28.0	41,499
2009	88,221	2.0	6.7	5.3	59.1	26.9	34,349
2010	94,406	1.1	13.9	6.0	53.1	26.0	43,883
2011	91,235	0.5	8.6	7.0	67.6	16.3	48,585
2012	96,818	1.0	6.0	10.8	58.1	24.2	50,425
2013	95,530	2.2	7.1	12.2	63.8	14.6	42,556

Figure A1. Comparsion of charter and non-charter boat salmonid harvest rates for the Illinois portion of Lake Michigan, 2004-2013

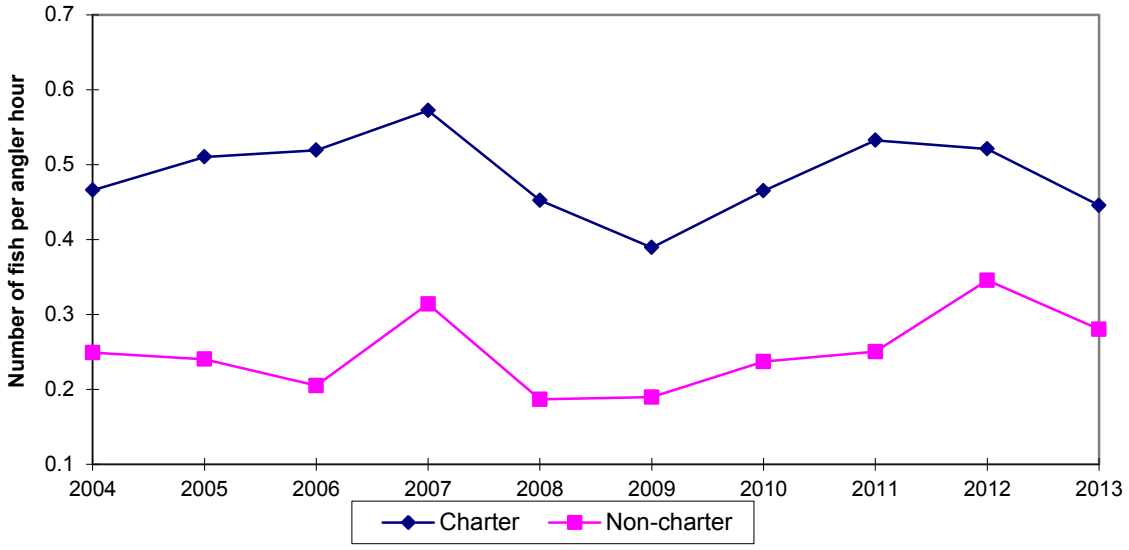


Figure A2. Illinois Lake Michigan sportfishing harvest (charter & regular combined) 2004 - 2013